IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Eui-Sun HONG et al.

Application No. 10/743,866 Group Art Unit: 1795

Confirmation No. 9364

Filed: December 24, 2003 Examiner: Alix Elizabeth Echelmeyer

For: SECONDARY BATTERY AND MANUFACTURING METHOD THEREOF

APPEAL BRIEF UNDER 37 C.F.R § 41.37

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Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to the Appellant's earlier filed Notice of Appeal on March 18, 2010, Appellant hereby appeals to the Board of Patent Appeals and Interferences from the final rejection mailed November 18, 2009. The Appeal Brief is timely filed, the period for response being set to expire on May 18, 2010. Appellant submits this Appeal Brief along with the filing fee of $540.00 set forth in 37 C.F.R. §41.20(b)(2). In view of the Notice of Panel Decision mailed April 16, 2010, the Appeal Brief is due May 18, 2010.

Also enclosed is a Claims Appendix in compliance with 37 C.F.R. § 41.37(c)(1)(viii). An Evidence Appendix in compliance with 37 C.F.R. § 41.37(c)(1)(ix) is enclosed and indicated as being NONE. A Related Proceedings Appendix in compliance with 37 C.F.R. § 41.37(c)(1)(x) is enclosed and indicated as being NONE.

I. Real Party in Interest

Due to the assignment executed on December 23, 2003 by the inventors Eui-Sun HONG, Sung-Jae CHO, Masaki KOIKE, Hiramura YASUAKI, Jin-Uk LEE, Jae-Chul UM, and Jung-Joon PARK and recorded in the United States Patent and Trademark Office at Reel 014843, Frame 0184, the real party in interest is as follows:

Samsung SDI Co., Ltd.
575, Shin-dong, Yeongtong-Gu
Suwon-Si, Gyeonggi-Do
Republic of Korea

II. Related Appeals and Interferences

Although the real party in interest has other appeals and interferences, none of the other pending appeals and interferences is believed to directly affect or be directly affected by, or have any bearing upon the decision of the Board of Patent Appeals and Interferences in this appeal.

III. Status of Claims

The status of the claims of the application is as follows:

Claims 1 – 10 and 13 - 15: rejected.

Claims 11 – 12 and 16 - 66: canceled.

Claims 11 – 10 and 13 - 15 are the subject of this appeal.

IV. Status of Amendments

Claims 1 – 10 and 13 - 15 were rejected in the final Office Action mailed November 18, 2009.

No amendments were included in the Applicants' response dated February 18, 2010 in response to the final Office Action. Accordingly, there are currently no outstanding issues regarding the status of amendments.

A copy of the claims involved in the appeal is included in the Claims Appendix.

V. Summary of the claimed subject matter

Aspects of the present invention are directed to a secondary battery. In particular, the secondary battery of independent claim 1 includes an electrode unit 30 having a positive electrode plate, a negative electrode plate and a separator disposed therebetween (FIG. 1 and page 5, lines 22 – 27), a can 10 having a side wall, an opening 11 at one end of the side wall, and in which the electrode unit and an electrolytic solution are accommodated through the opening (FIG. 1 and page 5, lines 18 – 21 and page 6, lines 22 - 27) and a closed bottom portion 12 at an opposite end of the side wall from the opening (FIGS. 2 and 3). The can is made of aluminum or an aluminum alloy (page 6, lines 21 – 22). A cap plate 21 is directly welded at the opening to seal the can (FIGS. 1 and 7 and page 6, lines 28 – 29. A surface coating 40 having a thickness of 30 μm to 100 μm (page 10, lines 11 – 21) is provided on an outer surface of only the bottom portion of the can and is not provided on the side wall of the can (page 8, lines 27 – 28).

Dependent claim 6 further recites that the secondary battery includes a safety device 70 and a lead unit that connects the positive and negative electrode plates through the safety device (FIGS. 4 and 7 and page 2, lines 18 – 19), wherein the lead unit includes a lead that is electrically connected to the safety device 70 and which is welded to the surface coating 40 (FIGS. 4 and 7 and page 10, line 27 to page 11, line 2). Dependent claim 7 further recites that the lead is welded to the surface coating by resistance welding (page 11, lines 3 – 9).

Claim 10 depends from claim 4, which recites that the surface coating has at least copper as a main component (page 9, line 29 to page 10, line 5). Claim 10 further recites that that the secondary battery includes a safety device 70 and a lead unit that connects the positive and negative electrode plates through the safety device (FIGS. 4 and 7 and page 2, lines 18 – 19), wherein the lead unit includes a lead that is electrically connected to the safety device 70 and adhered to the surface coating through soldering (FIGS. 4 and 7 and page 11, lines 6 - 7).

VI. Grounds of rejection

The following is a concise statement of each ground of appeal.

1. Whether the rejection of claims 1 - 7, 10, and 15 under 35 U.S.C. §103(a) as being unpatentable over Morishita et al. (U.S. Patent No. 5,976,729) ("Morishita") in view of Slezak (U.S. Patent Publication No. 2004/0058234) and Nakanishi et al. (U.S. Patent Publication No. 2002/0142211) ("Nakanishi") is in error.

2. Whether the rejection of claims 8 and 9 under 35 U.S.C. §103(a) as being unpatentable over Morishita in view of Slezak and Nakanishi, and further in view of Seiji (JP 60 124351) is in error.

3. Whether the rejection of claims 13 and 14 under 35 U.S.C. §103(a) as being unpatentable over Morishita in view of Slezak and Nakanishi, and further in view of Shibata et al. (EP 0 899 799 A2) is in error.

VII. Arguments

1. The rejection of claims 1 - 7, 10, and 15 under 35 U.S.C. §103(a) as being unpatentable over Morishita et al. (U.S. Patent No. 5,976,729) ("Morishita") in view of Slezak (U.S. Patent Publication No. 2004/0058234) and Nakanishi et al. (U.S. Patent Publication No. 2002/0142211) ("Nakanishi") is in error.

As reiterated by the Supreme Court in KSR International Co. v. Teleflex Inc., 127 SCt 1727, 82 USPQ2d 1385 (U.S. 2007), the framework for the objective analysis for determining obviousness under 35 U.S.C. §103 is based on the underlying factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148, 148 USPQ 459 (U.S. 1966). These factual inquiries are the scope and content of the prior art, the differences between the prior art and the claims at issue and the level of ordinary skill in the pertinent art. (see also, "Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*", 72 Fed. Reg. 57527 (Wednesday, October 10, 2007)), wherein

it was stated that "Factual findings made by Office personnel are the necessary underpinnings to establish obviousness."

In the Office Action of November 18, 2009, the Examiner made numerous, specific factual errors regarding the scope and content of the prior art and the differences between the prior art and the claims that undermine his allegations of obviousness such that the Examiner has failed to establish a *prima facie* case of obviousness.

Both the present application and Morishita are directed to solving problems relating to connecting a lead of a safety device or protection circuit to the bottom of a battery can, and more specifically, a lead made of nickel, a nickel alloy or nickel-plated stainless steel and a battery can made of aluminum or an aluminum alloy. In particular, as described at page 2, lines 20 – 26 of the present specification, ultrasonic welding and resistance welding are not suitable for attaching a nickel lead to an aluminum can. Ultrasonic welding is not suitable because of the infusibility of nickel, and resistance welding is not suitable because the high conductivity of aluminum makes it difficult to attain sufficient heat at the contact interface (see also, col. 1, lines 28 – 35 of Morishita). Laser welding can be used to attach aluminum to nickel, but if laser welding is applied to a lead that is attached to a safety device, the safety device may be damaged.

Morishita addresses problems relating to attaching a lead of a protection circuit to the bottom of an aluminum can by welding a lead plate (referred to in Morishita as a "lead plate for current utilization") onto the bottom of the can before the electrode assembly is inserted in the can and before the lead of a protection circuit is attached. Morishita describes that the lead plate may be nickel, iron, a nickel alloy or an iron alloy and may be attached by laser welding. Alternatively, Morishita describes that the lead plate may be a cladding plate having a first layer of aluminum or aluminum alloy and a second layer of nickel, nickel-plated iron, nickel-plated stainless steel and nickel-plated copper (see, for example, col. 1, line 64 to col. 3, line 21 of

Morishita). A lead connected to a protection circuit (referred to in Morishita as a "lead plate for connection") may then be welded to the lead plate.

As discussed in the present specification at page 2, line 27 to page 3, line 4, this solution provided by Morishita to address the problem of attaching a lead of a protection circuit to the bottom of an aluminum can may introduce additional problems, such as the risk that the bottom surface of the aluminum can may be damaged by welding, which could allow an electrolyte solution to leak from the weakened area.

The problems of the related art of attaching a lead of a safety device to the bottom of an aluminum can and the additional problems that may arise from welding a lead plate to the bottom of an aluminum can according to Morishita are addressed in independent claim 1 by providing a secondary battery including, among other limitations, a can comprising aluminum or an aluminum alloy and a surface coating having a thickness of 30 μm to 100 μm on the bottom of the can.

As acknowledged by the Examiner in the Office Action mailed November 18, 2009, Morishita does not describe a surface coating on the bottom surface of an aluminum or aluminum alloy battery can as recited by amended independent claim 1. In particular, as mentioned above, the "nickel layer" referred to by the Examiner with respect to Morishita is a lead plate that is welded onto the bottom of the aluminum battery can of Morishita and is not a surface coating.

Moreover, contrary to what was alleged by the Examiner in the Office Action mailed November 18, 2009, Morishita does not describe a surface coating on the bottom of a can, wherein the surface coating has a thickness of 30 μm to 100 μm. In the Office Action mailed November 18, 2009, the Examiner referred to a nickel layer of Morishita as being 0.10 mm (100 μm), referring to col. 5, lines 30 – 38 of Morishita. However, Applicants respectfully submit that

this description in Morishita relates to just the outer layer of a two-layer plate that is welded to the bottom of the can of Morishita. As described at col. 4, line 10 and col. 5, line 25 of Morishita, the lead plate of Morishita, whether it is a single layered or a two layered plate, has a thickness of 0.15 mm (150 μm). Accordingly, the description that a second layer of a two-layered plate has a thickness of 100 μm does not meet the limitation of a surface coating having a thickness of 30 μm to 100 μm provided on an outer surface of the bottom portion of a can as recited by independent claim 1.

Slezak, at paragraph [0105] referred to by the Examiner in the Office Action of November 18, 2009, describes a battery cell that includes a steel can having a nickel plating on the outside surface. Slezak does not describe that the nickel plating is only on the bottom surface of the steel can. In view of the description at col. 1, lines 22 – 24 of Morishita of the disadvantages of a steel can in terms of a greater likelihood of corrosion, it is reasonable to conclude that Slezak provides the nickel plating on all of the outer surfaces of the can in order to address the corrosion problem of its steel can. Moreover, Slezak does not describe a thickness of its nickel plating and more particularly, does not teach or suggest a surface coating having a thickness of 30 μm to 100 μm provided on an outer surface of the bottom portion of a can as recited by independent claim 1.

Since an aluminum can would not have such a corrosion problem as a steel can (see, for example, col. 1, line 23 of Morishita), there would be no need for the aluminum can of Morishita to have a nickel plating layer as described by Slezak. Accordingly, the rationale in Slezak for providing a steel can with a nickel plating does not provide any general reason for providing a nickel plating on an aluminum can.

Moreover, the Examiner has not established that a person skilled in the art would have considered substituting a surface coating on an aluminum can surface for a plate that is welded

to an aluminum can surface with a reasonable expectation of success, particularly in view of the known difficulties in attaching nickel to aluminum by methods such as resistance welding or ultrasonic welding. The allegation by the Examiner in the Advisory Action mailed March 4, 2010 that "a skilled artisan would have a reasonable expectation that nickel can be plated, because it is plated in Slezak" overlooks the fact that Slezak only describes plating nickel onto steel and does not describe plating nickel onto aluminum. Accordingly, since Slezak only describes a nickel plating on a steel can, Slezak does not address the question of whether a surface coating on an aluminum can would overcome the failure of other types of attachment of nickel to aluminum noted in Morishita. For example, Slezak provides no guidance as to whether forming a surface coating by plating on an aluminum can would predictably provide sufficient adhesion of the surface coating to the aluminum surface of the can.

Nakanishi does not overcome the failure of Morishita to teach or suggest a surface coating having a thickness of 30 μm to 100 μm provided only on an outer surface of the bottom portion of a can of a secondary battery. The Nakanishi reference is applied by the Examiner for its alleged teachings regarding an end cap attached to a battery can by welding, and Nakanishi contains no teachings relevant to a battery including a surface coating having a thickness of 30 μm to 100 μm provided on an outer surface of only the bottom portion of the can. Accordingly, because of differences in the materials involved, the combination of Morishita and Slezak does not establish that a surface coating on an aluminum can surface could be substituted for a plate that is laser welded to an aluminum can surface with a reasonable expectation of success.

Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness of claim 1 over Morishita, Slezak and Nakanishi. Claims 2 – 7, 10 and 15 depend from claim 1 and are allowable for the same reasons. Accordingly, the Examiner has not established a *prima facie* case of obviousness of independent claim 1 and 8 over Morishita, Slezak and Nakanishi. Claims

2 – 10 and 13 - 15 depend from independent claim 1 and are allowable for the same reasons. Therefore, the rejection should be reversed.

Separate argument for the patentability of claims 6, 7 and 10

Regarding dependent claims 6, 7 and 10, since Slezak only describes a nickel plating on a steel can, Slezak does not address the question of whether a surface coating of the recited thickness on an aluminum can could successfully provide a surface on which a lead can be welded, such as by resistance welding (claim 7) or by soldering (claim 10). Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness of claims 6, 7 and 10 over Morishita, Slezak and Nakanishi for this additional reason.

2. The rejection of claims 8 and 9 under 35 U.S.C. §103(a) as being unpatentable over Morishita in view of Slezak and Nakanishi, and further in view of Seiji (JP 60 124351) is in error.

Seiji does not overcome the failure of Morishita, Slezak and Nakanishi to teach or suggest a surface coating having a thickness of 30 μm to 100 μm provided on an outer surface of only the bottom portion of a can of a secondary battery as recited in independent claim 1, from which claims 8 and 9 depend. In particular, Seiji does not teach or suggest any thickness of its nickel or copper layer, and from the description in the Abstract of Seiji, the nickel or copper layer of Seiji appears to be a substantial structural component of the outer side of the battery and clearly is not a surface coating having a thickness of 30 μm to 100 μm. Therefore, combining the secondary battery of Morishita, Slezak and Nakanishi with a nickel or copper structure according to Seiji would not have met all of the limitations of the independent claim 1, from which claims 8 and 9 depend.

Therefore, the rejection should be reversed.

3. The rejection of claims 13 and 14 under 35 U.S.C. §103(a) as being unpatentable over Morishita in view of Slezak and Nakanishi, and further in view of Shibata et al. (EP 0 899 799 A2) is in error.

Shibata does not overcome the failure of Morishita, Slezak and Nakanishi to teach or suggest a surface coating having a thickness of 30 μm to 100 μm provided on an outer surface of only the bottom portion of a can of a secondary battery as recited in independent claim 1, from which claims 13 and 14 depend. In particular, the layers described in Shibata cover the entire jar can and are not limited to the bottom of the can. Moreover, Shibata explicitly states that its nickel-plated layer is not more than 5 μm. Therefore, combining Morishita, Slezak, Nakanishi and Shibata would not have met all of the limitations of independent claim 1, from which claims 13 and 14 depend.

Therefore, the rejection should be reversed.

VIII. Conclusion

In view of the law and facts stated herein, the Appellant respectfully submits that the Examiner has failed to cite a reference or combination of references sufficient to maintain obviousness rejections of the rejected claims and has failed to rebut the arguments in the Amendment dated October 10, 2007 and in the applicants' previous responses.

For all the foregoing reasons, the Appellant respectfully submits that the cited prior art does not teach or suggest the presently claimed invention. The claims are patentable over the prior art of record and the Examiner's findings of unpatentability regarding claims 1 – 10 and 13 - 15 should be reversed.

The Commissioner is hereby authorized to charge any additional fees required in connection with the filing of the Appeal Brief to our Deposit Account No. 50-3333.

Respectfully submitted,

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Date: May 17, 2010

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IX. Claims Appendix

1. A secondary battery comprising:

an electrode unit having a positive electrode plate, a negative electrode plate and a separator disposed therebetween;

a can having a side wall, an opening at one end of the side wall, and in which the electrode unit and an electrolytic solution are accommodated through the opening and a closed bottom portion at an opposite end of the side wall from the opening, the can comprising aluminum or an aluminum alloy;

a cap plate directly welded at the opening to seal the can; and

a surface coating having a thickness of 30 μm to 100 μm provided on an outer surface of only the bottom portion of the can and not provided on the side wall of the can.

2. The secondary battery of claim 1, wherein the surface coating has at least nickel as a main component.

3. The secondary battery of claim 2, wherein the surface coating is formed by at least one method selected from the group consisting of electrolytic plating, electroless plating and sputtering.

4. The secondary battery of claim 1, wherein the surface coating has at least copper as a main component.

5. The secondary battery of claim 4, wherein the surface coating is formed by at least one method selected from the group consisting of electrolytic plating, electroless plating, sputtering and cladding.

6. The secondary battery of claim 1, further comprising a safety device and a lead unit which connects the positive and negative electrode plates through the safety device, the lead unit comprising a lead electrically connected to the safety device and which is welded to the surface coating.

7. The secondary battery of claim 6, wherein the lead is welded to the surface coating by resistance welding.

8. The secondary battery of claim 7, wherein the surface coating comprises a first material, the lead comprises a second material other than the first material, and a melting point difference between the first and second materials is 500 °C or less.

9. The secondary battery of claim 8, wherein a melting point difference between the first and second materials is 200 °C or less.

10. The secondary battery of claim 4, further comprising a safety device and a lead unit which electrically connects the positive and negative electrode plates through the safety device, the lead unit comprising a lead electrically connected to the safety device and which is adhered to the surface coating by soldering.

13. The secondary battery of claim 1, further comprising a metal layer between the surface coating and the outer surface of the bottom portion of the can, wherein the metal layer comprises a first material, the can comprises a second material including the aluminum or the aluminum alloy, the surface coating comprises the second material, and the second material is different from the first material.

14. The secondary battery of claim 13, wherein the first material of the metal layer comprises at least one material selected from the group consisting of Zn, Sn, Fe and Cr.

15. The secondary battery of claim 1, wherein a thickness of the bottom portion of the can is in the range of 0.2 mm to 0.8 mm.

X. **Evidence Appendix**

NONE

XI. Related Proceedings Appendix

NONE